Factors Determining the Degree of Commercialization of Smallholder Agriculture: The Case of Potato Growers in Kombolcha District, East Hararghe, Ethiopia

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Abstract

Potato is one of the most valuable and widely consumed crops in the world in general and in Ethiopia in particular. Similarly, in Kombolcha District, it is among the most important crops grown for sale and consumption by smallholder farmers. Commercializing such crops does have multiple benefits for the smallholder farmers of the district as the district has great potential for commercial vegetable production and there is a growing market opportunity for the products. However, potato growing smallholders in the district are producing at a subsistence level and their participation in the market (degree of commercialization) is not only low but also varies across the district. Hence, this study was initiated to identify factors determining the extent of market participation (degree of commercialization) of potato growers. Five potato growing Peasant Associations (PAs) were selected purposively from a total of 10 Peasant Associations and subsequently 133 respondents were selected using simple random sampling from the sampling frame i.e. potato growers. A formal survey was conducted to collect data, which was supported by focus group discussions and key informant interviews. Both descriptive statistics and Robust OLS model were employed to analyze quantitative

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data; whereas qualitative data were analyzed using narrations and interpretations. The OLS results indicated that farm size allocated to potato, access to irrigation and access to market information were found to be significant in affecting extent of market participation (degree of commercialization) at 1 % probability level. Hence, organizing farmers into groups in order to have better access to irrigation, providing market information through networking and institutions and improving extension service and availing improved varieties, overall, modernizing potato production are therefore crucial in enhancing the extent of market participation (the degree of commercialization).

Key terms: Market Participation, Smallholder Farmers, Degree of Commercialization, potato growers

Introduction

Commercialization of production systems is a process through which a household production goal changes from subsistence to profit maximization and a production system in which households produce market oriented products based on the preference of consumers. Commercialization is a process involving a deliberate action on the part of the producers to use their land, labor, implements and inputs in such a way that profit is maximized from the crops produced or animals raised for exchange or sale (Hinderink and Sterkinberg, 1987; cited in Ejupu, 2001). Hence, in the era of globalization, smallholder farmers need to produce for the market as they are competing with farmers around themselves and with those producing the same commodity at regional as well as global level (Birhanu *et al,* 2006).

Potato is among the widely grown crops in the world in general and in the study area in particular. In the study area there are tremendous opportunities

for those that are engaged in potato production such as endowment with suitable climatic factors, access to irrigation, access to market i.e. the district's strategic location to access the major consumption centers such as Harar, Dire Dawa, and Jigiga as well as proximity to the export market (Djibouti and Somaliland). Moreover, the expansion of market infrastructure such as telephones and access to electricity also foster market participation. To exploit the growing opportunities for commercial production of potatoes, the farmers in the district need to change their production system from subsistence to market oriented production. This requires enhancing the coordination and integration of various stakeholders like extension, marketing and other institutional services.

However, there is apparent knowledge gap as regards to factors influencing the degree of commercialization of vegetable producers in general and market participation of potato growers in Kombolcha district in particular. Thus, this research has been initiated to analyze factors affecting the extent of market participation (degree of commercialization) of potato growers in the district.

Methodology

Description of the study area

Kombolcha district is one of the eighteen districts of East Hararghe Zone of Oromia Regional State. It is located at about 17 km north of Harar town and 542 km east of Addis Ababa, the nation's capital city. Kombolcha district has an estimated total land mass of 446.61 km and a total population of 119,661 of which 56,995 are female. The total number of households in the district is 24,801 of which 418 of them are female-headed households.

Moreover, the total cultivated land of the district is 12,604 hectare. Due to large number of population and intensive cultivation, the area is one of the severely degraded areas in east Hararghe with high soil fertility depletion resulting into poor agricultural productivity (both crop and livestock). The altitude of the district ranges from 1200-2460 meters above sea level. Agro-climatically, the district ranges from *Woina-dega (mid-altitude)* to Kola (low lands). The annual rainfall ranges from 600mm to 900mm with a bimodal and erratic pattern. The mean annual temperature of the area ranges between 16-25°$_C$.

Different types of vegetables and cereals are grown in the district. The most commonly grown vegetables are potato, cabbage, onion, carrot and among the cereals sorghum and maize are dominant. Chat is also one of the intensively grown crops in the area. Potato is one of the major vegetables grown for income generation and consumption in the district. It ranks first among the vegetables grown in the study area in terms of volume of production. The study area is also one of the potato trading centers in the country from which potato is sold for export and domestic market (Bezabih, 2008).

Sampling Procedure

From the sampling frame with 10 Peasant Associations (potato growers), 5 PAs namely Bilisuma, Qaqali, Burkadin, Qereensa and Cheffee Anani, were selected purposefully based on their accessibility in consultation with the experts in the district and extent of potato crop coverage. Total samples of 133 respondents were drawn from all PAs for the survey from which equal number of sample respondents were selected. Seven experts and nine Development Agents were interviewed as key informants so as to get in-

depth information about the area. Five to Eight members, who were well aware of the issue under investigation as well as about the community they represent, were identified for each of the three focused group discussions.

Methods of data collection

Both quantitative and qualitative data were gathered which are of primary and secondary in nature. Producer's survey, key informant interview, and focused group discussions, were used to gather data on socio-economic, institutional and demographic and personal factors determining marketing participation of the individuals. Personal observation and informal discussions were also made so as to elicit information to support the data obtained from the producers. In addition, secondary data were reviewed from various sources such as documents from district office of agriculture and rural development and empirical findings related to the topic of interest. Structured and semi-structured interview schedules and checklists were developed and pre-tested to be used to collect data from producers and key informants. Trained enumerators, who are familiar with the local culture and language, were used to conduct the survey.

Method of Data analysis

In this study, extent of market participation is expressed in terms of the volume of produce sold to the market by the household. Due to the nature of the dependent variable i.e. extent of market participation, OLS model was employed to analyze the effects of different factors over the independent variable. The justification is that the sample respondents were producing potato both for sale and consumption, as a result, the researchers preferred to use OLS model as the dependent variable was found to be continuous i.e.

all the households were participating regardless of the amount they are supplying to the market. But this model does not deal well with multicollinear independent variables, and cannot handle missing data as well as the functional relationship between dependent and independent variables must be known (Washington and Wolf, 1975).

Model Specification

The economic model specification of the variables is indicated as follows.

$Yi = B_0 + B1\ X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5 ... + B_{14} X_{14}$

where: B_0= *is the intecept*

Bj, $B_2 ... B_{14}$ *= are coefficients*

Yi = Quantity of potato supplied to market

$X_{1;} .... X_n$= Explanatory variables

Both Multicillinearity and Hetroscedasitcity tests were carried out and diagnostic tests were made to correct the problems. Variance Inflation Factor (VIF) and Contingency Coefficient were employed for the continous and dummy explanatory variables, respectively. Breusch-Pagan/Cook-Weisberg test for heteroscedasticity was employed to detect the presence of heteroscedasticity problem. Hence, to overcome the problem of heteroscedasticity, Robust OLS analysis with heteroscedasticity consistent covariance matrix was employed.

Explanatory Variables

Table!. Definition and Measurement of Explanatory Variables

Variable	Descrption/ measurement	Expected sign or relationship with market participation
Sex	! if the household head is male and 0 otherwise	+/-
Experience (expersup)	Number of years of supplying potato to the market	+
Farm size (farmsize)	Farm size allocated to poato in hectare (ha)	+
Family size famlysze)	Number of family members in the household	+
Distance (diskomb)	Distance from Kombolcha town/market in kilometers	-
Market information (acesminf)	Access to market information: ! if they have access to market information and zero otherwise	+
Credit access (credacc)	! if the respondent had access to credit and zero otherwise	+
Cooperatives (coopmem)	! if the person is a member of cooperatives or zero otherwise	+
Training (training)	Training participation: ! if the person participates in training and 0 otherwise	+
Irrigation (irrigaccs)	Irrigation access: ! if the respondent have access to irrigation and 0 otherwise	+
Hired labor (hired)	! If the household uses hired labor and zero otherwise	+
Education (edulevel)	Educational level of the household: ! if the household have formal education and 0 otherwise	+
Livestock(TLU)	Livestock ownership in TLU Ownership	-
Price(Price)	Last years' premium price per quintal (Birr)	+

Result and Discussion

Socio-economic characteristics

Land

Land is one of the indispensable resources for the livelihood of the majority of the population in the district. The estimated average land holding size of the repondents is 0.35 hectare (stdv. 0.13) and with a minimum of 0.1 hectare and the maximum size of holding about 1.19 hectare. The estimated average farm size alloted to potato production is 0.18 ha (Table 2).

Table 2. Socio-economic characteristics of the respondents

Description	Cheffee Anani	Burkadin	Qaqali	Bilisuma	Qereensa	Overall
Farm size (land holding (ha)	0.19	0.38	0.45	0.28	0.23	0.31
Proportion of households with access to irrigation	7.51	5.26	10.53	10.53	4.51	38.3
Size of irrigated land (ha)	0.06	0.1	0.17	0.17	0.1	0.12
Livestock owned (TLU)	3.23	2.42	2.68	2.79	3.3	2.89
Proportion of male-headed households	17.3	19.55	17.29	18.8	20.3	93.2
Proportion of literate household heads	12.8	9	12.03	9.8	12.03	56.6
Family size (no)	9	5.07	6.16	5.00	6.57	5.95
Proportion of households Using hired labor	1.5	1.5	0.75	4,07	2.26	10.08

Source: Own survey, 2009

Access to irrigation

The other important input in the production of potato is irrigation. About 38 % of households in the study PAs have access to irrigation with average irrigated land of 0.12 ha. But there are variations in access to irrigation and households' irrigated land across the PAs. This variation in access to irrigation might contribute to the difference among households in extent of market participation. On the other hand, 62 % of the respondents rely only on rainfall to produce potato and other crops. This might be due to lack of labor and capital to drill wells as well as water unavailabilty (Table 2).

Distance to the nearest market center

Distance from the nearest market center often influences the extent of market participation by households. This is particularly true for vegetable, which is a perishable product. On average, the sampled households/PAs are at a distance of about 6 kilometers from the nearest market center which is Kombolcha market.

Livestock

Another important resource in farming is households' livestock ownership. In addition to draught power, livestock provides multiple products and services. The average livestock owned by respondent in TLU is estimated to be 2.89. It is one important means of livelihood in the district in generating income (Table 2).

Education

Education is also one of the variables affecting market participation. This may be due to the fact that those who are educated can use the infomation available in a better way than those who are not educated (illiterate) (Table 2).

Labour/Family Size

The availability of labour in general and family labour in particular is crucial in farming, such as, in labour intensive potato production. In the study PAs, family labour is the primary source of labor for crop production and livestock husbandry.

The average family size of the respondents is 6. As it has been revealed above in Table 2, the family provides a major source of labor for vegetable production due to the presence of large family size. Some households use hired or exchange labor to augment the shortage of family labor force for vegetable and other crop production. Only about 10% of the respondents reported using hired labour for farming activities. This implies that the use of hired labor in the district is at its infant stage. This might be due to low level of market orientation of the farmers and the presence of high family labor force (Table 2).

Potato Production

Households participation in potato production

Almost all of the respondents (98%) were reported to have been involved in potato production during the main rainy season (summer) whereas only 38%

of the respondents were found to have been engaged in potato production during the dry season. This variation among the respondents as regards to potato growing across the two seasons might be due to difference in access to ground water (irrigation) and access to credit (financial capital) to buy water pumps.

Purchased input use in Potato production

As indicated above, significant proportion (38%) of farmers were found to have been engaged in producing potato during the dry (off) season. Farmers usually are using different varieities and fertilizers as inputs for potato production. The intensity of input use, however, varies from farmer to farmer (Table 3).

Table 3. Potato Variety and fertilizer use of respondents (N= 133)

Description	Frequency	Percentage
Local variety	106	79.5
Improved variety	27	20.5
Organic fertilizer	19	14.3
Inorganic fertilizer	51	38.8
Both (organic and inorganic) fertilizer	49	36.8
Non-users of fertilizer	14	10.5

Source : Survey result, 2009

Overall, 79.5 *%* of the farmers were growing local varieities and the remaining use improved potato varieities. Among the respondents, 14.3%, 38.8% and 36.8% of the respondents use organic, inorganic and a combination of both fertilizers, respectively. A siginificant number of farmers were using local varieities which is an indication for low level of market orientation in the district (Table 3).

The key informants and focused group discussants had also pointed out that the probable reasons for low level of market orientation might be due to lack of access to modern inputs such as seeds, lack of awareness of the farmers on such inputs and their management practices, lack of information on where to get inputs and lack of linkage between research and extension related to potato production. This obviously calls for the need for such technical skills in producing potato, such as, land preparation, seed selection and rate, planting depth, planting time, fertilizer use, plant protection and postharvest techniques. In the focus group discussion with the producers, it was suggested that farmers eventually rely on local varieties and traditional farming practices. In additions, the main sources of fertilizer in the district are traders, whereas, few producers rely on neighbours, cooperatives and public extension system. This implies the low level of involvement of other sectors in the input supply and marketing of such inputs.

Yield

The average productivity of potato in the study area (130 qt/ha) is also lower than the world average (160 qt/ha). The average yield of potato varies across seasons and PAs. The estimated yields across seasons vary and the focus group discussants also noted that the productivity of irrigated fields is better than rain-fed fields. This might be due to less disease and pest infestation during the dry season. They also noted that the supply trend of potato is decreasing in the dry season due to lack of access to water (irrigation).

Potato Marketing

According to the focus group discussants and key informants, there are different actors in the marketing of potato, such as producers, middlemen, traders and consumers in the marketing of the produce. According to key informants, there is no institution primarily concerned in assessing the volume, quality, standard and processing of potato or any other vegetables for that matter in order to safeguard the interest of all actors. The price of the commodity is determined by exporters and sometimes putting the producers in disadvantaged position. This implies that the producers are price takers and the exporters are directly or indirectly setting the price of potato.

Table 4. Marketing outlet choice of the sampled respondents (No=133)

Pas	Place of sale		
	Farm gate (%)	Kombolcha (%)	Harar (%)
Cheffee anani	2.23	17.29	0
Burkadin	3.76	13.53	3.76
Qaqali	2.23	16.54	0
Bilisuma	1.5	15.04	3
Qereensa	12.78	7.52	0.75
Overall	22.57	69.92	7.51

Source: Survey result, 2009

The respondents are selling their produce at different marketing centers. The majorities (70%) of the respondents are selling their produce in Kombolcha town to wholesalers, retailers and consumers, whereas, 22.57% of the respondents sell their produce at the farm gate and very few (7.5%) of the producers sell at other markets like Harar. This is crucial as it determines the degree of commercialization.

Determinants of market participation

The market participation of these smallholder farmers is affected by different factors, such as demographic, institutional and socio-economic variables as indicated in the following Table.

Table 5. Determinants of market patricipation of potato growers (N=133)

Variable	Mean	t	Sign
Access to credit	21.6	.550	NS
Access to market information	32.4	6.9	.000***
Access to irrigation	33.14	8.82	.000***
Participation in training	24.13	1.142	NS
Cooperatives (%)	21.7	.424	NS
Education	20.24	1.67	NS
Sex	22.5	-.153	NS
Hired labor	29	1.8	.068*
Family size	5.95	-.454	NS
Farm size(ha)	.18	2.738	007***
Farming Experience	9	1.45	NS
TLU	2.89	-1.31	NS
Distance(kms)	5.86	-1.98	.049**
Last year's price (birr)	301	2.597	01***

*** Significant at 1% significant level *= significant at 10 % significant level

NS= not significant Source: Own computation, 2009

Market information, irrigation accessibility, farm allocated to potato, distance from the main (nearest) market center and last year's price were found to have been significant in influencing market participation. The aforementioned explanatory variables were subjected to further regression analysis using OLS to see the degree of influence of each explanatory variable on extent of market participation.

Econometric result

Multiple linear regression analysis was employed to see the degree of influence of different factors on market participation or the decision of households to commercialization. Although there are differences in the extent of participation among the producers, all the respondents were supplying their produce either at the farm gate, district market and other markets like Harar.

Table 6. OLS estimation of factors affecting farm level intensity of market participation

Variable	Coef.	Std. Err	t	P>|t|
Constant	2.091157	6.356083	0.33	0.743
Sex	-4.12914	3.885531	-1.06	0.290
Famlysze	-.2101806	.3024828	-0.69	0.489
Farmsize	59.50402	15.97541	3.72	0.000***
Irrigaccs	16.0699	2.490014	6.45	0.000***
Training	1.342583	1.753848	0.77	0.446
Credacc	.9175699	2.004299	0.46	0.648
Coopmem	1.513187	2.351973	0.64	0.521
Expersup	.2094687	.2156416	0.97	0.333
Acesminf	7.831318	2.696982	2.90	0.004***
Diskomb	-.2061907	.2653344	-0.78	0.439
Hired	6.513643	4.168858	1.56	0.121
Edulevel	1.519295	1.801455	0.84	0.401
TLU	-.4437695	.5172487	-0.86	0.393
Price	.0128207	0124844	1.03	0.307

*** significant at 1% level of significance n= 127 F(14, 110) =21.20 Prob > F = 0.0000 R-squared = 0.6383 Adj R-squared = 0.5923

Source: Own computation, 2009

Land allocated for potato: The size of land allocated to potato was hypothesized to affect the degree of commercuialization (marklet

participation) positively. The independent t-test shown in Table 5 indicated a significant mean difference in market participation between those alloted above and below the average land (0.18 ha) at 1% siginificance level. The positive sign of the coefficient implies the more the farmer allocated a land, the higher would be the production and hence the higher would be the amount of potato supplied to the market, i.e. extent of market participation as revealed in Table 6. Similarly, Mahlet (2007), pointed out that land is the most important factor of production determining commercialization of vegetables in Ethiopia. Other researchers also confirmed that when the size of farm allocated to vegetables by producers increases, their market participation also increases (Lerman, 2004).

Access to irrigation: Irrigation is one of the most important inputs enabling farmers to produce vegetables during off-season which helps them grow potato twice or three times a year. Of the total respondents, 38.3% of them have access to irrigation; whereas the remaining respondents have no access to it. Likewise, the key informants pointed out that multiple cropping in the area is highly determined by irrigation and allows individuals to use their land intensively. It was found to be significant in both the descriptive and OLS analysis. It has a positive sign which probably implies that when poeple have access to irrigation , given all other factors constant, the extent of market participation probably increases. The possible reason might be that irrigation allows farmers to plant twice a year and the disease and pest infestation is less severe during the dry season as it was indicated in the focused group discussion. As a result, yield of potato will be increased which also increases the probability of participation.

Access to market information: Accesss to market information was found to be one of the significant factors affecting extent of market participation of

farmers in the study area, keeping all other factors constant. The respondents obtain information from various sources such as traders, neighbors and relatives residing in towns. However, there are no formal institutions providing information to farmers which affects their production plan and decision making role as pointed out in the focus group discussions. Those who have access to market information probably participate in the market more than those who do not have access to it. This might be due to accessibility of information about prices, seasonal price variations and demand of the commodity.

Conclusion and Recommendation

In this study, producers were found to be constrained by high price of fertilizers, low level of input supply, lack of improved seed which is an indication for the low level of market information. The descriptive statistics result noted that distance from the market center; previous year's price and hired labor partly affect the volume of produce supplied to the market. Besides, farm size allocated to potato; access to irrigation and access to market information were found to be the major factors determining extent of market participation of the producers in the district. The concerned organizations like agricultural extension should provide market information about prices, consumers' preference and other related information which serve as a base for planned production. The public extension programs need to promote staggered planting for those who have access to irrigation and prepare a common platform among producers, traders and all other actors. The producers need to be organized together so as to develop their capacity to access to irrigation and access to different agricultural inputs like fertilizer and improved varieties.

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